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Inflected and periphrastic features: issues of comparison and modelling

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1. Introduction

In recent years there has been renewed discussion in the linguistic literature of periphrases, that is syntactic constructions that express information similar to that realised by inflection and thus seem to straddle the syntax–morphology divide. Structures like the English perfect or progressive are without doubt composed of more than one syntactic element, but at the same time the information associated with them, it has been argued, cannot be distributed amongst the component parts in a compositional manner. What is more, the information associated with the perfect or progressive is similar in nature to that associated with inflected word-forms in the language like the past or present tenses. In morphological studies past and present are often expressed as 'features'. In some recent approaches to periphrasis, syntactic constructions like the English perfect and progressive have also been associated with 'features'. In this paper I would like to explore the nature of such 'periphrastic' features (in the sense: realised by periphrases). In the next section, I will summarise the arguments that have been put forward in the literature for treating periphrasis as relevant to morphology, as well as syntax. I will then explore some of the relevant properties of inflectional features as a useful starting point for the discussion of periphrastic features. Next, periphrastic features will be the focus of attention. I will first look at the role tensed elements play within periphrases. Then I will look at 'nested' periphrases and what can be said about their featural content. In the last sections I look at the consequences of these observations for how periphrastic features can be incorporated in models of periphrasis. It is important to highlight from the outset that the discussion will be underpinned by some theoretical commitments. One of them is the use of features itself: the assumption that morphosyntactic and morphosemantic information is/can be expressed in grammars in this way. Another is the general approach to morphology assumed: an inferential-realisational one, which is based on a particular view of paradigms and a particular view of morphemes.

2. General properties of periphrasis

Periphrases are by definition syntactic. They consist of one or more elements that are syntactic terminals and stand in some syntactic relationship to each other. The syntactic relationship is not necessarily the same across structures and across languages. In fact, Bonami and Webelhuth (2013) make a case that periphrastic constructions are very diverse in this respect.

Periphrases, however, have a morphological side too. The most powerful argument that can be put forward for the morphological nature of periphrases is the fact that they can fill cells in an otherwise inflectional paradigm. This property has been discussed in the literature on morphosyntax at least since Matthews (1991), but is also crucial for Sadler and Spencer (2001) and Ackerman and Stump (2004). Russian can provide an example. In this language verbs distinguish perfective and imperfective aspect and past, present and future tense. There

are no present perfective forms for semantic reasons. In the future, perfective verbs have an inflected form. Imperfective verbs, however, don't have inflected future forms. Instead, they form their future periphrastically: with the help of the auxiliary verb *byt'* 'be' and the infinitive of the lexical verb. This is illustrated with the 3SG forms of the perfective *vypit'* and the imperfective *pit'* 'drink' in (1) below.

(1)

	PRESENT	FUTURE
PERFECTIVE	--	*vypit*
IMPERFECTIVE	*pjet*	*budet pit'*

Bonami (2015) furnishes a detailed discussion of this property of periphrasis and shows that periphrases can behave on a par with inflection in terms of paradigmatic organization. For some scholars participation in paradigms is not the only property that can properly delimit periphrasis. They extend the definition to cover constructions that are not incontrovertibly part of inflectional paradigms, but express information that is similar and therefore presents itself as an alternative choice to the information expressed by inflection within the same language. The distinction between constructions that fill cells in inflectional paradigms and constructions that express information normally carried by inflection is not necessarily very clear-cut, see the discussion in Spencer and Popova (2015), for example.

Ackerman and Stump (2004) propose as another criterion for distinguishing periphrases from the rest of syntax their tendency to exhibit morphosyntactic non-compositionality. Essentially this means that in periphrasis some of the information carried by the elements of the construction is 'neutralised' and replaced by new information at the level of the construction. For example, the negated future tense in Bulgarian is composed by the present tense form of the special negative form of the verb *imam* 'have' and the inflected present tense form of the lexical verb. But this present tense inflection on the elements that are part of the construction is overriden, as it were, at the level of the construction, which denotes not present, but future time reference.

The fact that periphrastic constructions can be part of inflectional paradigms, the fact that they express grammatical information very similar to the information associated otherwise with inflectional forms and the fact that they can 'neutralise' the information expressed by inflection, i.e. their morphosyntactic non-compositionality, has led to a view of them as syntactic structures that express morphosyntactic or morphosemantic features, features like the perfect or the progressive in English. The purpose of the discussion that follows is to examine the nature of these features further.

In the next section I will look at some of the properties assumed for inflectional features. The following section looks at periphrastic features. The data I am looking at come mostly from the domain of (finite) verbal aspect and tense, so I will look mostly at the non-compositionality of periphrasis with respect to these. I then turn my attention to cases where there is a nesting of periphrastic features, i.e. where in a periphrastic construction the auxiliary element is itself a periphrase. I will make the argument that such 'nested' periphrases are also non-compositional. I then explore briefly what effect adopting non-compositionality in this way might have on existing formalisations, in particular on the most recent and detailed formalisation of periphrasis in Bonami (2015).

3. Inflectional features

To say that a language possesses a feature, say one of number, is to say that there is a regular correspondence between certain forms and certain (grammatical) meanings. The forms in

question are usually word-forms. So, for example, the forms *dogs*, *cats*, and *horses* are systematically associated with the meaning 'more than one (dog, cat or horse)' and can be contrasted with *dog*, *cat*, and *horse* which mean 'one (dog, cat and horse)'. The presence of /s/, /z/ or /iz/ at the end of the first group of words seems to serve as a signal for this interpretation. The lack of this signal is itself meaningful, so the lack of /s/, /z/ or /iz/ in a form becomes as significant as their presence and the forms with and without the ending are in contrast to each other. As a shorthand for this situation and because it helps build economical descriptions, we say that these English nouns are associated with a feature NUMBER, which can have two values: *plural* (the meaning 'more than one', associated with the presence of an /s/, /z/ or /iz/ at the end of nouns; some call this ending an exponent of the value) and *singular* (the meaning 'one', expressed via the lack of any exponent). The introduction of a feature NUMBER allows the linking of the systematic changes in nouns described above to the differences in function in related forms like *this* and *these*, or *that* and *those* or, in the verbal system, to the difference between a present tense form like *bark* and the present tense form *barks*. In other words, introducing a feature NUMBER in a language like English will allow for an economical statement of grammatical phenomena like agreement. For more on features see Corbett (2012), for example.

There is another sense in which a feature like NUMBER is important for a grammatical description: it is obligatory. A grammar of English generally needs to associate all noun word-forms in the language with some number value: singular or plural. This is independent of the precise way in which exponence works.[1]

Given the facts of agreement, NUMBER is a morphosyntactic feature in English. But obligatoriness can apply to morphosemantic features such as TENSE as well. For example, in most cases an English verb is either inflected for the past tense or for the present tense (in 3SG) or is interpreted as a present tense: *barked* vs *bark(s)* or *bark*. Generally, we say that the values of an inflected feature are mutually incompatible, so, for example, a verb can be past or present, but not both.[2]

4. Periphrasis

If, following recent proposals in the literature, we assume that certain multiword constructions, for example the English *has taken*, are to be treated as forms of a lexeme, on a par with inflected forms like the 3SG present tense *takes* (see, for example, Börjars et al. 1997, Ackerman and Stump 2004, Bonami 2015), then we would associate this string with a feature e.g. PERFECT, and this feature becomes part of the set of features associated with word-forms in the language which might also include, for example, TENSE: *present*.

As we saw above, inflectional features are obligatory and have values that are mutually exclusive. The next question is how periphrastic features fit in with and compare to inflectional features. This seems to be a question that is touched upon, but rarely discussed in detail in the literature. I turn to it next.

[1] So the noun *sheep* is really two forms: *sheep* singular and *sheep* plural, because we can talk about *this sheep* and *these sheep*. One could, of course, also say that this particular form in English is undefined with respect to number and therefore compatible with both singular and plural meanings. And, given that English verbs don't always give clear information about number, one could imagine a sentence like *The sheep came to graze* where nothing clarifies whether one or more than one sheep are being referred to.

[2] This glosses over some complexity. On the one hand, it assumes that English doesn't have future tense, with which some scholars disagree, see for example Salkie (2010) and references therein. On the other, as in the case of *sheep* previously, it omits verbs like *put* which have the same form for past and present (or which, one might say, are unspecified for tense).

4.1 Periphrasis as part of inflectional paradigms: periphrastic values

The most frequently discussed case of the relationship between features realised inflectionally and features realised periphrastically has already been illustrated. This is precisely the case where a multiword construction fills in a cell in an otherwise inflectional paradigm, a situation called 'feature intersection' in recent work on periphrasis (Ackerman and Stump 2004, see also Brown et al. 2012). The multiword construction in this case realises not some independent feature, but one or more values of one or more features whose other values are realised via inflection. So in this case, as with the typical inflectional features discussed above, the values are mutually exclusive. A Russian verb is generally either perfective or imperfective in terms of the feature ASPECT, and either past or present in terms of the feature TENSE. When it is both perfective and future, it is inflected (and has a certain exponent) and when it is both imperfective and future it is periphrastic (and its exponent is a multiword construction). This is one way to account for the fact that periphrastic forms in scenarios like this one are limited; for example there are no periphrastic future forms for perfective Russian verbs.

4.2 Periphrastic sub-paradigms: periphrastic features

In many cases where we find multiword syntactic constructions that express grammatical meaning, however, these multiword constructions are not filling cells in otherwise inflectional paradigms in the narrow sense described above, and so it isn't immediately obvious what the relationship between features expressed periphrastically and those expressed inflectionally should be. Let's for the moment assume some associations from traditional descriptions, which are often taken over in theoretical discussions as well. As pointed out above, we could say that the English construction *have* + V*en* is associated with some meaning 'perfect', or that the English construction *be* + V*ing* is associated with the meaning 'progressive'. The question then is, are these features in their own right, or perhaps values of some feature, e.g. ASPECT. If we assume that these are values of aspect, we will end up with a feature whose values are not mutually exclusive, since in English progressive and perfect can combine as in *have been* V-*ing*. This phenomenon has been called nesting, or stacking, of periphrases (see Popova and Spencer 2012) and is of particular interest to this paper. Such mutual compatibility of values would make English aspect unusual when compared with typical inflectional features like (past and present) tense. Similar arguments would apply to considering perfect and progressive to be values of the feature TENSE.

If we want to maintain that values are always mutually exclusive, we could assume that PERFECT and PROGRESSIVE are independent features. And since they don't have other values, we will have to make them binary ± features. This is precisely the assumption that seems to be made in a recent detailed formal model of periphrasis laid out in Bonami (2015).

The next question is how to express the relationship between these features and the feature TENSE: *past* or *present* which we know we need for English verbal inflection. The auxiliary verbs in both the (finite) perfect and the progressive periphrases are tensed, and the tense of the auxiliary can shift between present and past. In English this seems to lead to changes in meaning which are fairly transparent and compositional. For this reason, perhaps, TENSE: *past* and *present* is usually assumed to be in intersection with perfect: ± and progressive: ±. If we assume that tense is a feature that is independent of the periphrastic features and that tense is defined over a periphrastic construction and that the tense of the construction is the same as the tense of the auxiliary verb, we will obtain the description in Table 1 (all forms are in the 3SG):

	TENSE	PERFECT	PROGRESSIVE
barks	present	−	−
barked	past	−	−
has barked	present	+	−
had barked	past	+	−
is barked	present	−	+
was barking	past	−	+
has been barking	present	+	+
had been barking	past	+	+

Table 1: Tense, perfect and progressive in English as independent features

This picture suggests that the presence/absence of the auxiliary can be associated with the presence/absence of the feature perfect/progressive, and that distinctions like *perfect*, or *progressive* are additional to existing tense distinctions in the language.

The position that periphrastic features in a language depend on its inflectional potential and that periphrases are in some sense an 'expansion' of its existing inflectional features is an attractive one, given the data from languages like Lithuanian, for example. Lithuanian has synthetic past, present, and future forms and also synthetic frequentative past tense forms. The distinctions made in the inflectional system appear to carry over to the system of periphrastic (or compound) tenses via the auxiliary, as the examples below in Table 2 show (the examples are drawn from Ambrazas 1997: 237):

synthetic inflection		periphrasis	
present	*dìrba* 'works'	perfect	*yrà dirbęs* (m), *dìrbusi* (f)
past	*dìrbo* 'worked'	past perfect	*bùvo dirbęs, dìrbusi* 'had worked'
past frequentative	*dìrbdavo* 'used to work'	past perfect frequentative	*Bū́davo dirbęs, dìrbusi* 'used to have worked'
future	*dir̃bs* 'will work'	future perfect	*bùs dirbęs, dìrbusi* 'will have worked'

Table 2: Synthetic and periphrastic tenses in Lithuanian

The perfect tenses are formed with the help of a finite form of the auxiliary *būti* and the past active participle of the main verb (which distinguishes masculine and feminine gender). The auxiliary is respectively in the following tenses: present for the perfect, past for the past perfect, past frequentative for the past frequentative perfect and future for the future perfect.

The literature on periphrasis, however, suggests that periphrastic constructions can be non-compositional in terms of the morphosyntactic information expressed by the elements in the periphrase and the morphosyntactic information associated with the construction as a whole (see discussions in Ackerman and Stump 2004 or Brown et al. 2012, for example). There are indeed data to suggest that the association of the construction directly with the tense of its elements is not so straightforward. I turn to some such data next.

5. Idiomaticity of tense in periphrasis

Inflectional distinctions are not always simply taken on and incorporated in multiword constructions. Some inflectional distinctions can equally be neutralised in periphrastic forms. A case in point is Bulgarian. This language has two synthetic past tenses: imperfect and aorist. A verb like *rabotja* 'work', for example, has two inflected past tense forms (here in the 3SG): the aorist *raboti*, and the imperfect *raboteše*. Bulgarian also has a rich system of periphrastic tenses. Amongst them are the perfect and the pluperfect, formed with the verb *sâm* 'be' and a participle of the main verb. The auxiliary in the pluperfect is in the imperfect past tense, but there is no opposition between imperfect and aorist in the pluperfect. So the aorist/imperfect opposition is neutralised when it comes to the periphrastic tenses.

Bulgarian, like other languages with periphrastic tenses, has some forms where an element in the present enters into a construction with an element in the past. An example is the future in the past, formed with an auxiliary meaning 'want' inflected in the past tense (imperfect) and the present tense form of the lexical verb (here 'work'): *šteše da raboti*. If we follow the assumption that the whole multiword expression functions as a word form and then assume that the tense values associated with the elements of such a multiword expression are simply added to the set of feature/values associated with the expression as a whole, then present and past tense values will have to co-exist within the same set, which is in contradiction to them being mutually exclusive.

In addition, periphrastic forms might have their own constraints. Lithuanian provides an example. Amongst the periphrastic forms in Lithuanian are the so-called continuative tenses (Ambrazas 1997: 321f) which are formed by the prefixed (with *be-*) present active participle of the verb and an inflected form of the auxiliary verb *būti* 'be'. There is no present continuative, only past, past frequentative and future continuative.[3] The reason for this gap cannot be formal, as the auxiliary has a full paradigm.

The observations above suggest that in periphrases the tense distinctions made by the inflected verbs within them (most often, but not always, the auxiliary verbs, or 'ancillary elements' in the terminology introduced by Bonami) cannot simply be carried over from the inflected verbs. Unless, of course, we manage to find an analysis that will derive the semantic interpretation of the overall construction from the tense values of the elements that comprise it. It is difficult to claim that such an analysis does not exist. But as an indication that it might be difficult, here are some examples of how different languages derive different periphrases from similar inflectional resources.

Basque has a system of periphrastic aspect/tense features not dissimilar to that found in English and Bulgarian. In Basque, most tense/aspect verbal forms are periphrastic. Only a handful of verbs have synthetic inflection for present and past.[4] The majority of Basque verbs, therefore, have periphrastic tense/aspect forms. According to de Rijk (2008: 143), there are six major periphrastic tenses in the language, illustrated in Table 3 with an intransitive verb 'fall' and the auxiliary *izan* 'be' used with intransitive verbs.

[3] According to Ambrazas (1985: 322), only the past continuative is more widely used in the contemporary language. The other forms are restricted to the Samogitian dialect.

[4] I ignore for the moment other forms, for example those relating to mood.

The present imperfect: Imperfect participle + present tense auxuliary *Ibaira erortzen da.* 'He is falling into the river.'
The past imperfect: Imperfect participle + past tense auxiliary *Ibaira erortzen zen*. 'He was falling into the river.'
The present perfect: Perfect participle + present tense auxiliary *Ibarira erori da*. 'He has fallen into the river.'
The past perfect: Perfect participle + past tense auxiliary *Ibaira erori zen*. 'He fell into the river.'
The (present) future: Future participle + present tense auxiliary *Ibaira eroriko da*. 'He will fall into the river.'
The past future: Future participle + past tense auxiliary *Ibaira eroriko zen*. 'He was going to fall into the river.'

Table 3: Periphrastic tense/aspect forms in Basque (adapted from de Rijk 2008: 143)

As can be seen from Table 3, the meaning and composition of periphrastic constructions in Basque is analogous to that of other languages. For example, the present and past imperfect in Table 3 bear striking similarities with the progressive in English: an eventuality in progress with present time reference or with past time reference. Both of these tenses are composed with the help of the imperfect participle, and they differ only with respect to the tense of the auxiliary, to which the difference in time reference can be attributed.

The perfect is also analogous to the perfect in other languages, like English or Lithuanian. It is formed with the perfect participle of the verb and a present tense auxiliary. However, the form that is analogous to the past perfect in other languages (perfect template but with a past tense auxiliary) has different semantics. In English and Bulgarian and other languages this form can be associated with locating a moment in time before some other past moment, i.e. with what is most frequently termed the pluperfect in grammatical descriptions. In Basque this form is put to a different use and the meaning is most frequently a simple past. The following example of this non-hodiernal perfective past is given by Oyharçabal (2003: 265):

(2) *Atzo* *Peru* *ikusi* *nuen*.
Yesterday Peru see.PRF AUX.PST
'Yesterday I saw Peru.'

Very probably, the lack of an inflected past leaves a gap which is filled in by available linguistic resources. Despite the similarity of formal means across languages, the meaning expressed by the forms can vary depending on the needs of the particular language; form-meaning correspondences are decided within the available system of oppositions. One consequence of such observations is the conclusion that periphrastic constructions are, in some sense, idiomatic. Their interpretation cannot be inferred in a straightforward manner from the interpretation of their constituent parts. A further consequence is that constructions that are similar except for the tense of the auxiliary cannot be seen to be 'derived' from each other. The perfect and the (formally) past perfect in Basque need to be declared separately in the grammar. Further support for such independence of related constructions comes from Bulgarian. In Bulgarian both the future tense and the future in the past are formed with the help of an ancillary that historically comes from the verb *šta* 'want'. In the future this ancillary is, historically, a 3SG present tense form which has grammaticalised into an uninflected semi-clitic. In the future in the past, on the other hand, the verb *šta* 'want' retains inflection and has a somewhat different syntactic relationship with the main verb. Another

reason not to think of two constructions that differ only in the tense of the ancillary element as being 'derived from each other' and being 'the same with a different tense value' is that constructions like this can have different meaning, so the formal opposition may not be mirrored by a semantic opposition. For example, in Lithuanian the past continuative seen above can mean an action which was begun as intended, but not finished. The examples below are from Ambrazas (1997: 250-251).

(3) Jùras jau bùvo beatkeliąs atvỹkstantiems vartùs, bet vẽl juõs privérė.
'Juras was about to open the gate for the visitors, but closed it again.'

The future continuative, by contrast, expresses a supposition: an action which is supposed to have taken place in the future, or sometimes in the present:

(4) Jìs jau trẽčią pãčią bùs beturi̇̃s.
'(I think) he has a third wife already'.

The idiomaticity of periphrasis with respect to the inflectional values of the elements that comprise it is recognised in the literature, see references in Brown et al. (2012), or Spencer and Popova (2015), for example. As mentioned before, it is definitional for Ackerman and Stump (2004). The discussion above, if along the right lines, reinforces this view. The more important point here is what consequences idiomaticity would have for the set of morphosyntactic properties associated with a periphrastic construction. If we assume that the present perfect in English is not the present tense of a perfect construction, and past perfect is not the past tense of a perfect construction, but instead both constructions express some feature independent of the present and past values of tense (say, the binary features PRSPERF and PSTPERF), and a similar case is made for the progressive, the situation we saw in Table 1 will resemble the situation in Table 4.

	TENSE	PRSPERF	PSTPERF	PRSPROG	PSTPROG
barks	present	−	−	−	−
barked	past	−	−	−	−
has barked		+	−	−	−
had barked		−	+	−	−
is barked		−	−	+	−
was barking		−	−		+
has been barking		+	−	+	−
had been barking		−	+	−	+

Table 4: Perfect and progressive in English as independent features, but no tense

If we represent the features in this way, we can actually model the present and past tenses, and the present perfect construction, the past perfect construction, the present progressive construction and the past progressive construction as the values of a single feature, because now then are mutually exclusive.

However, *has been* V*ing* and *had been* V*ing* still present a problem, because it looks like the perfect and the progressive are both part of these constructions at the same time. This raises the question of how such nested periphrases should be interpreted and represented. Is nesting of periphrasis compositional, or idiomatic? The next section tries to look for an answer.

5.1 Nested periphrases

'Nesting' of periphrases can often be understood as resulting from a construction where one of the elements (most frequently the auxiliary) is itself 'inflected' for some feature whose realisation is a periphrastic construction. For example, Popova and Spencer (2013) argue that the future perfect in Bulgarian needs to be understood as a perfect (periphrastic) construction in which the auxiliary has been 'inflected' for the future, which itself is periphrastic. This is not dissimilar to constructions where an auxiliary is tensed. For example, the nested forms in Bulgarian for the future perfect (see Table 5) are cognate with the forms in Table 6 in Lithuanian. Lithuanian, however, has in inflected future, so there is no nesting.

PERFECT	FUTURE	FUTURE PERFECT
(az) sâm rabotila	*(az) šte rabotja*	*(az) šte sâm rabotila*

Table 5: Perfect, Future and Future Perfect of 'work' in Bulgarian

PERFECT	FUTURE	FUTURE PERFECT
yrà dìrbęs	*dir̃bs*	*bùs dìrbęs*

Table 6: Perfect, future and future perfect of 'work' in Lithuanian
(examples are drawn from Ambrazas 1985: 237f)

The English system of auxiliary constructions can also be understood as a system of nested periphrases. The perfect progressive was mentioned already. It can be understood (and has been modelled in Bonami 2015) as the progressive periphrastic construction in which the auxiliary is 'inflected' in the perfect. Thus, the perfect progressive of *work*, *has been working*, can be understood as the progressive template for 'work', that is BE + *working*, in which the auxiliary BE appears in the perfect: *has been*.

In the previous section I argued that there is evidence of idiomaticity with respect to the tense values in periphrasis. The question that arises now is whether there is evidence of similar idiomaticity in the case of nested constructions. Current formalisations of the English nested periphrases assume that *has been working* is a form of WORK with feature specification PERF +, PROG + (Bonami 2015). The question is whether this logic could be applied to nested periphrases cross-linguistically.

To establish whether compositionality exists, we could look at the combinations of cognate forms across languages. For example, Udihe, like English, has perfect and progressive. The perfect is inflected, whereas the progressive is periphrastic and is formed by the infinitive of the lexical verb and an inflected copula meaning 'to be'. The copula can be inflected for the perfect, potentially leading to a combination of perfect and progressive. However, rather than a meaning like the English perfect progressive, this construction is semantically equivalent to the progressive with the auxiliary in the past tense, and both mean past progressive. The examples below are taken from the description of Udihe in the Surrey Morphology Group Periphrasis Project:[5]

(5) a. *umi-mi* *bi-si-ni*
drink-INF be-PAST-3SG
'he was drinking'
b. *imi-mi* *bi-s'e*
drink-INF be-PFV.3SG
'he was drinking'

[5] For more details please visit http://www.smg.surrey.ac.uk/periphrasis/

An even stronger piece of evidence for the lack of predictability in nested periphrasis comes from Basque. Basque has a habitual perfect (past and present) which is used to refer to habits lasting up to a specific point in time (see de Rijk 2008: 149). This periphrase consists of perfect participle of the main verb and a perfect tense form of the auxiliary.

Oyharçabal (2003: 258) adds to the above other uses of this form, for example to express some kind of remoteness, and illustrates it as follows (examples adapted, for sources of examples see original):

(6) a. *Andiabruak asko aldiz tentatu izan zuan.*
there devil.ERG many times tempt.PRF be.PRF AUX
'There the devil tempted him many times'.

b. *Erraztasun onetatik kalte andiak etorri izan dira.*
Facility these.ABL damage big come. PRF be. PRF AUX
'Great damages have come from these facilities'

It will be difficult to see how the logic suggested above for English, where one possibility for a progressive perfect nested periphrase was to see it as a periphrase which expresses PROG+ and PERF+, can be applied to the Basque habitual, which will then need to be associated with the specification PERF+, PERF+. It is not clear how such a form will be modelled, or how its meaning will be deduced. Instead, the Basque example seems to invite us to set up a new feature for this form, say HABITUAL+, which is then composed of the perfect form of the auxiliary embedded in the perfect construction.

The conclusion to draw from these examples is that we have to treat a nested periphrase as we do the tense specification on an element of a periphrastic construction. To model the construction we need to know that a certain element needs to be in a certain tense (whether inflected or periphrastic), but this tense is not directly part of the feature specification of the overall construction. The feature values presented in Table 4 will now look as in Table 7 below.

	PRSPERF	PSTPERF	PRSPROG	PSTPROG	PRSPERFPROG	PSTPERFPROG
has barked	+	−	−	−	−	−
had barked	−	+	−	−	−	−
is barking	−	−	+	−	−	−
was barking	−	−		+	−	−
has been barking	+	−	−	−	+	−
had been barking	−	−	−	−	−	+

Table 7: Independent inflected and periphrastic feature values in English as independent features

This isn't the assumption about nesting adopted in one of the most recent formal models of periphrasis, namely Bonami (2015), instead nesting is conceived as compositional, such that the perfect progressive in English, for example, is the result of generating the progressive and then the perfect of the auxiliary. Changing the compositionality assumption in the model has interesting consequences. I next turn to a summary of Bonami (2015) and a discussion of a putative amendment of it.

6. An existing formal model of periphrasis

The most recent formal model of periphrasis is based largely on the assumptions outlined in the initial sections of this paper. It assumes that the morphological system of a language is modelled via the inferential-realisational framework of Paradigm Function Morphology

(PFM), whereas for the syntactic system it employs the mechanisms of HPSG This paper will focus on the morphological side of the analysis, i.e. on the generation of periphrastic forms via paradigm functions along the lines suggested for inflection in Stump (2001). In PFM the inflected forms of a lexeme are generated by a paradigm function (PF) which takes a root of a lexeme (or its lexemic index in some approaches) and a set of morphosyntactic features that represent a cell in the paradigm of that lexeme, and generates a word-form which has that same set of morphosyntactic features. Formally this is expressed as shown in (7), for more details see Stump (2001: 43f.):

(7) $PF(<X,\sigma>) =_{def} <Y,\sigma>$
Where X is the root of a lexeme, and Y is a word-form of the same lexeme, and σ is a set of morphosyntactic features.

The analysis in Bonami (2015) is based on the insight that periphrasis can be modelled analogously to (flexible) syntactic idioms like *spill the beans*. The elements of such an idiom can be endowed with some special meaning which when combined gives the meaning of the whole, but the elements need to be constrained to stand in a relationship of mutual selection so they always co-occur. Bonami borrows the mechanism of reverse selection from analyses of idioms in the HPSG literature (for example, Sailer 2000, for further references in Bonami 2015) and allows the paradigm function to introduce reverse selection requirements. More formally, Bonami (2015: 87) expresses this in the following way:

(8) A reverse selection requirement φ carried by a word w_1 is satisfied if and only if w_1 is syntactically selected by a word w_2 and w_2 verifies property φ.

The paradigm function for the perfect tense can then be expressed in the following way (see Bonami 2015: 101):

(9) If l is a verb, then for any property set $\sigma \supseteq$ {PRF+},
PF (l, σ) = <<φ, σ>, {<*have-prf*, σ!{PRF−}>}>,
where PF(l, σ!{VFORM *pst-ptcp*}) = <<φ, σ!{VFORM *pst-ptcp*}>,∅>

Essentially, the paradigm function says that the perfect of a verb l is a past participle of the verb that reverse-selects for the *have*-perfect auxiliary. To deliver the past participle form of l and the auxiliary with the right properties, the paradigm function for the perfect of l calls two other paradigm functions. Notable is the stipulation that the auxiliary should be marked as not perfective (PFR−). This stipulation is aimed at preventing the paradigm function for the perfect from applying to the auxiliary in the periphrastic construction, and this preventing forms like **has been been*. Nested periphrasis obtains when a cell in a lexeme's paradigm contains two periphrastic features, for instance both perfect and progressive, that are set to +. To account for such forms, Bonami (2015: 102) suggests the following:

(10) a. If l is a verb, then for any property set σ ⊇ {PROG +},
PF(l, σ) = <<φ, σ>, {<*be-prog*, σ!{PROG −}>}>,
where PF(l, σ!{VFORM *prs-ptcp*}) = <<φ, σ!{VFORM *prs-ptcp*}>, ∅>.

b. If l is a verb, then for any property set σ ⊇ {PRF +, PROG −},
PF (l, σ) = <<φ, σ>, {<*have-prf*, σ!{PRF−}>}>,
where PF(l, σ!{VFORM *pst-ptcp*}) = <<φ, σ!{VFORM *pst-ptcp*}>, ∅>.

The paradigm function in (a) above realises the feature progressive. It stipulates that the realisation of the progressive is the present participle of the lexeme which reverse-selects for a *be*-progressive auxiliary. The paradigm function in (b) realises the perfect, but is stipulated to apply only when the progressive is set to −. This means that the paradigm function in (b) cannot apply before the progressive paradigm function, ruling out forms like **is having read*. Specifying the PF realising the perfect in this way also means that it can apply to the progressive auxiliary, which has been marked as PROG−, thus producing the necessary nested form.

This approach essentially assumes compositionality of tense in periphrasis, as well as compositionality of nested periphrases, insofar as the set of available features is concerned. Non-compositionality in Bonami (2015) is not precluded, but relies not on how features are set up, but rather on what features are 'pushed down' by the periphrastic PFs to the PFs that realise the (inflected) elements of periphrastic constructions. One consequence of approaching non-compositionality this way is that special formal mechanisms are needed to ensure that periphrasis is not recursive and that periphrastic paradigm functions apply in a set order. The question now is what will happen if we assume non-compositionality and encode it in the feature sets, as argued above. This is the subject of the next section.

7. Consequences for the formal modelling of nested periphrases

For reasons of space this section will focus on one example of nested periphrasis, namely the progressive perfect in English. As argued in previous sections, one possible way to translate the non-compositionality assumptions with respect to nested periphrases is to assume that a construction like the perfect progressive is associated not with a set of features containing PRS+, PERF+, PROG+, but rather a single specification, which for convenience was named *prs-perf-prog*. Given the assumptions above, this specification could be treated as one of the values of the feature TENSE. This is now the only feature-value in the set of features associated with a word-form like *has been reading* that can trigger a periphrastic realisation, so the order of progressive and perfect becomes irrelevant. This paradigm function would look something like the following:

(11) If *l* is a verb, then for any property set σ ⊇ {TNS: *prs-perf-prog*},
PF(*l*, σ) = <<*φ*, *σ*>, {<*be*, σ!{TNS: *prs-perf*}>}>,
where PF(*l*, *σ*!{VFORM *prs-ptcp*}) = << φ, σ!{VFORM *prs-ptcp*}>, ∅>.

Not only has the order of progressive and perfect become irrelevant, but so has recursion. The paradigm function in (11) above calls in a PF that realises a set of features which contains the specification TNS: *prs-perf*, but as this is an alternative value of tense, the PF realising TNS: *prs-perf-prog* cannot re-apply.

8. Discussion

The main aim of this paper is to discuss the issue of non-compositionality in constructions that have come to be known as periphrastic, i.e. constructions that are syntactic, but express grammatical meaning usually associated with inflection. The focus is primarily on constructions associated with tense-aspect meanings. Many of the constructions surveyed here consist of a participial form and an inflected ancillary (auxiliary) element. The main point put forward is that periphrastic constructions can be non-compositional, not only when it comes to the tense values associated with their ancillary forms, but also when it comes to the embedding of one periphrase into another, i.e. when their ancillary elements are themselves periphrastic (so called 'nested', or 'stacked' periphrases). There are various ways to allow for

such non-compositionality in the formal models associated with periphrasis. This paper proposes that one way this can be done is to associate a periphrase with feature-values which are not realised by any of its elements. It then explores what consequences such an approach might have if existing formalisations (such as Bonami 2015) are adapted to express non-compositionality in this way.

The main consequences seem visible when the model is applied to nested periphrases. Nested periphrases seem to pose at least two problems: order of application (should we talk about the progressive template with a perfect auxiliary, or the perfect template with the progressive auxiliary?) and recursion (why not have a progressive template with a progressive auxiliary?). Both of these issues seem to disappear if non-compositionality is approached as suggested here.

This can be argued to be perhaps simply a matter of formal convenience. It remains a valid observation, however, that the order of nested periphrases appears to be largely stipulative, and that periphrasis rarely employs recursion. So stipulative order and non-recursion are another way in which periphrasis resembles morphology rather than syntax. And if so, then non-compositionality could be linked to the mixed (morphosyntactic) nature of periphrasis. In other words, periphrasis exhibits what Dahl (2004) calls 'featurization', the association of a form with features. In the case of periphrasis this featurization is also linked to a distribution in a paradigmatic space. The organization of periphrases in a paradigmatic space would explain a form-meaning correspondence which is related not to the meanings of the component parts, but to the oppositions in a system of similar form-meaning pairs.

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